

Potential Growth and Rebalancing in China

Cai Fang and Ivan Roberts*

In rapidly growing emerging economies such as China, it can be difficult to distinguish changes in long-term trends in growth from short-term macroeconomic cycles. This article provides a narrative account of recent phases in Chinese economic growth, and explores the role of cyclical and structural factors in shaping China's recent growth performance. It reviews evidence documented by Lu and Cai (2014) suggesting that the slowing of GDP growth in recent years has resulted from a decline in the potential growth rate rather than being a cyclical downturn. The article emphasises the positive impact that reforms which raise labour force participation and productivity could have on the growth of potential output in China. It suggests that 'rebalancing' the economy's demand from investment and exports towards consumption may not be sufficient to prevent a decline in potential growth but that, at a minimum, such rebalancing would probably be conducive to a more stable macroeconomic cycle.

Introduction

In 2014, China experienced its fourth consecutive year of GDP growing at a rate below the 10 per cent average pace of the period of 'reform and opening' that began in 1978. While the slowdown is widely interpreted as structural in nature, and few people believe that it will be possible to return to the era of double-digit growth rates, there is still debate regarding the causes of slowing growth and appropriate policy responses.

Since the process of structural change in emerging economies such as China is likely to be more pronounced than in more developed economies, it can be difficult to distinguish cyclical fluctuations from changes in trend growth. Different conjectures about the causes of slowing growth can have different implications for policy. If the slowdown is interpreted as a slowing of potential growth, driven by supply-side factors, policy solutions targeting the supply side of the economy may be most relevant

to policymakers seeking to sustain rising incomes. But if weaker growth of aggregate demand related to the macroeconomic cycle is the main reason for the slowing of growth, a range of stimulus measures may be more appropriate policy options. Incorrectly diagnosing the cause of the slowdown could lead to undesirable outcomes. For example, applying stimulus measures that boost expenditure to address a structural slowing in growth could lead to higher consumer and asset price inflation. By the same token, policy actions that contribute to increased excess capacity in parts of the economy could hasten the emergence of disinflationary pressures.

This article provides an account of recent phases in Chinese economic growth. It focuses on the supply-side factors underpinning slowing growth in China, with reference to estimates of actual and potential GDP growth over recent decades. It suggests that a heavy reliance on demand-side countercyclical stimulus policies could lead to less desirable macroeconomic outcomes. It remains the case, however, that the demand side of the economy is important, so while reforms leading to a rebalancing of demand may not increase potential growth in the same way that supply-side policies would, they can

* Cai Fang is Vice-President of the Chinese Academy of Social Sciences. Ivan Roberts is from Economic Group. This work is the result of collaboration that began during Professor Cai's visit to the Reserve Bank of Australia in 2014. The views expressed in this article are the authors' own and should not be attributed to the Reserve Bank of Australia.

still help to stabilise the macroeconomy, smooth cyclical volatility and contribute to sustainable long-term economic growth.

Competing Views on China's Economic Slowdown

Based on data for a large number of countries, Eichengreen, Park and Shin (2011) present evidence suggesting that, in general, economies experiencing rapid growth will eventually face a significant slowdown, defined as a fall of at least 2 percentage points in the seven-year average growth rate. Pritchett and Summers (2014) similarly report a strong empirical association between the pace of growth and the likelihood of a deceleration. China's official GDP growth rate has exceeded 7 per cent in each of the past 24 years. Seen from this perspective, the deceleration of Chinese growth that has occurred is hardly unexpected.

Indeed, the idea that high-growth economies eventually experience a decline in growth is widely understood by economists. The intuition can be explained with reference to a simple production function:

$$Y = f(TFP, K, H, L). \quad (1)$$

In this equation, Y represents GDP, which in turn is a function of total factor productivity, TFP , and the factors of production: the physical capital stock available at the end of the previous period, K , the human capital stock, H , and the labour supply, L . Many emerging economies slow down because (a) they get closer to the productivity frontier (i.e. TFP growth slows); (b) growth of the population and/or the labour force slows; (c) the growth in the physical or human capital stock slows; or (d) because the returns to capital and the other factors of production that accumulate over time eventually diminish in the absence of growth in productivity or the other factors.

Cross-country data suggest that since the 1970s it has been relatively unusual for major advanced economies to achieve real GDP growth rates in excess of 3–4 per cent for sustained periods. By comparison, it has not been uncommon for large

developing economies to sustain growth rates faster than 5 per cent per annum for a run of years.¹ But academic observers disagree on whether China has yet reached the stage at which a structural slowing of growth should be expected.

On the one hand, Justin Yifu Lin (2011) has argued that the problems facing China are cyclical rather than structural, and stem from a slowing of China's export demand due to a cyclical slowing in the advanced economies in the wake of the global financial crisis. Accordingly, he has advocated a policy of continuing to expand investment to stimulate economic growth.

On the other hand, a number of commentators have endorsed more pessimistic scenarios involving the eventual 'collapse' of China's growth model and an ensuing crisis. Chang (2012) infers from the challenges posed by unfavourable demographics that China will soon replace Michigan in the United States as the world's new 'rust belt'. Similarly, Paul Krugman has argued that the Chinese growth model will soon hit a 'Great Wall' and is sceptical that China will make necessary policy adjustments in time to avert such an outcome (Krugman 2013).

Krugman's argument is based on the idea that growth in developing economies can be driven by investment for very long periods, because the gradual transfer of surplus labour from unproductive employment in rural areas to productive employment in urban areas slows the diminishing returns to capital. In Krugman's view, this transfer of surplus labour has allowed China to sustain more than 30 years of rapid growth, but he warns that the Chinese economy will eventually reach its 'Lewis turning point' (where surplus rural labour has been exhausted as a result of urbanisation).² Krugman further contends that if sufficient rebalancing from investment to consumption has not been achieved at that point and the economy continues to rely

1 These patterns can be observed in data from the Penn World Table Version 7.0.

2 The 'Lewis turning point' was first proposed by Lewis (1954) and revised by Ranis and Fei (1961). See Cai (2011) for a discussion of this concept in the Chinese context.

on ‘excessive’ investment, the result will be sharply diminishing returns to capital. All else equal, this would lead to slower longer-term growth.

Rapid growth of investment has made a significant positive contribution to economic growth in China. The expansion of the capital stock has often embodied technological progress and thereby contributed to TFP growth. It has also raised the capital-to-labour ratio and hence growth in labour productivity and higher returns to labour which, in turn, have supported the growth of household consumption. However, if the Lewis turning point has already been passed, as argued by Cai (2011), and ongoing improvements in labour productivity depend on ever higher capital-to-labour ratios with no improvement in broader total factor productivity, then diminishing returns to capital will tend to have a dampening effect on economic growth. Diminishing returns to capital are likely to be observed in the long run even though the timing of a slowdown in growth depends on the efficiency with which capital is allocated across regions and industries. Inefficient allocation of capital would also tend to reduce the scope for strong growth of incomes, which would otherwise support the government’s stated objective of rebalancing growth away from investment and towards consumption.

Distinguishing Trend and Cycle: Phases in China’s Economic Growth

One way of differentiating long-term structural trends and short-term macroeconomic cycles is to use the concept of potential output, which can be defined in various ways. For example, it can be defined as the level of output in the absence of nominal rigidities (Woodford 2003), or as the maximum output possible without inflationary pressure (Okun 1970).³ Four basic situations can be envisaged: actual and potential output growing strongly together; actual growth running at a slower rate than potential growth; actual growth and potential growth running at similarly low rates; or actual growth exceeding

the rate of potential growth (Figure 1). During the period of ‘reform and opening’ that started in the late 1970s, the Chinese economy has experienced several phases of growth, which can be represented in terms of these hypothetical situations.

Figure 1: Actual and Potential Growth

		Potential output growth	
		Strong	Weak
Actual output growth	Strong	Situation 1	Situation 4
	Weak	Situation 2	Situation 3

Situation 1: Actual and potential output growing strongly together

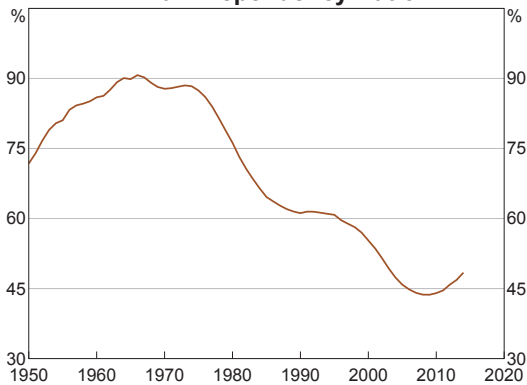
The first situation (actual and potential output growing strongly together) is consistent with labour being relatively abundant and the capital stock still growing rapidly, such that diminishing returns to these factors have not yet set in. In China, this situation prevailed for much of the period prior to 2010, when China was still enjoying a ‘demographic dividend’ in the form of a falling dependency ratio (the ratio of children and the elderly to the total population) that underpinned relatively strong growth in potential output (Graph 1). Using a production function similar to Equation (1) above, Lu and Cai (2014) estimate that between 1978 and 2009, potential growth averaged around 10 per cent per annum (Graph 2).⁴ The combination of strong growth of supply and strong growth of demand allowed China to achieve rapid actual GDP growth during this period.

Over the first 30 years or so of the reform era, the growth of the working-age population and the steady decline of the dependency ratio enabled the rapidly growing working-age population to accumulate savings which, in turn, underpinned the capital accumulation needed for economic development. Meanwhile, abundant labour supply meant that diminishing returns to physical capital could be

³ The latter is closest conceptually to the estimates of potential output growth presented in this article.

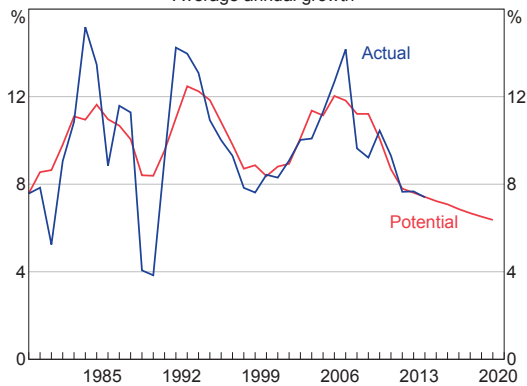
⁴ The estimates shown in Graph 2 are similar to those obtained by others using a variety of techniques (for example, see Anand *et al* (2014), Felipe, Lanzafame and Zhuang (2014) and IMF (2014)).

Graph 1
China – Dependency Ratio*



* Non-working-age over working-age population; working-age population is between 15 and 59 years
Sources: National Bureau of Statistics of China; RBA; United Nations

Graph 2
China – Actual and Potential GDP
Average annual growth



Source: Lu and Cai (2014)

avoided, thereby ensuring that investment made a significant contribution to economic growth. Human capital was also accumulated at a rapid pace through education. Finally, the large-scale transfer of surplus rural labour from unproductive occupations in agricultural areas to more productive jobs in urban areas resulted in higher productivity growth than would otherwise have been the case. According to Cai and Zhao (2012), in the 1982–2010 period, the contributions to GDP growth of capital, labour and human capital were, respectively, 73.7 per cent, 7.1 per cent and 4.2 per cent. The decline in the dependency ratio contributed 6.7 per cent through

its effect on other factors of production. The implied contribution of the remainder – that is, total factor productivity – was 15 per cent.

At the same time, the growth of household incomes, rapid growth of investment and the strong boost to China’s exports stemming from China’s entry to the World Trade Organization (WTO) in 2001 meant that estimated growth of potential output coincided with rapid growth of private and public demand, and hence actual output, particularly during the early to mid 2000s. Although actual growth has periodically fluctuated above and below its estimated potential rate, the difference between the two growth rates has rarely remained large for extended periods.⁵ Extrapolating current trends, these estimates suggest that potential growth is likely to slow further in coming years.

Situation 2: Actual growth running at a slower rate than potential growth

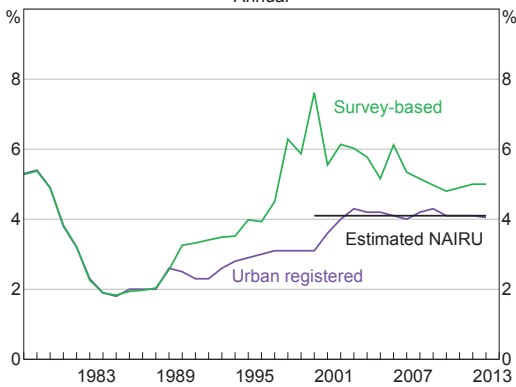
The second situation (combining strong growth of potential output and weak actual output growth) is consistent with a cyclical downturn. For example, a negative temporary shock to demand may weaken actual growth, notwithstanding still strong potential growth for reasons such as those noted earlier (e.g. rapid capital formation or a declining dependency ratio). This situation often gives rise to dislocations in the labour market, resulting in cyclical unemployment.

In the reform era, there are two examples of such episodes in the Chinese labour market. First, in the late 1990s, slowing domestic growth combined with weak external demand due to the 1997–98 Asian financial crisis led to a fall in capacity utilisation and

⁵ It might be expected that during periods when actual output exceeds its potential level, a rise in inflation would be observed. Despite the steady liberalisation of product markets during the reform era, however, the government has succeeded in maintaining relatively tight control over inflation, notwithstanding a fluctuating gap between estimates of actual and potential GDP. As a result, it is hard to detect a clear long-run relationship between inflation and production function-based estimates of the output gap such as that of Lu and Cai (2014), although the relationship has become somewhat closer in recent years.

resulted in large-scale unemployment. The fact that many redundant workers in urban state-owned enterprises were laid off but not counted by the statistical agency as unemployed during this period meant that the effect was not apparent in official urban registered unemployment statistics. Estimating the actual urban unemployment rate using survey-based employment indicators suggests that in the late 1990s/early 2000s, China's urban unemployment rate rose to hitherto unseen levels (Graph 3). Subsequently, a resumption of global demand for China's exports following WTO entry allowed a situation of rapid growth in supply to be absorbed by resurgent growth of demand.

Graph 3
China – Unemployment Rate
Annual



Sources: Du and Lu (2011); National Bureau of Statistics of China

A second episode of weak actual growth coinciding with strong estimated growth of potential output was the period affected by the global financial crisis of 2008–09. The failure of both the registered and surveyed urban unemployment rates to respond noticeably to the downturn in aggregate demand during this period is a puzzle at first glance. However, it can be explained by the fact that migrant labourers, who had transferred from the countryside to the cities, were most affected by the negative demand shock, and consequently returned *en masse* to rural areas. These ‘floating’ workers are not reflected in the urban registered unemployment figures because they only include those workers with local

urban *hukou*, a form of permanent registration that guarantees them access to certain welfare benefits provided by the government (including health care and education services). The lack of a comprehensive social safety net for migrant workers in urban areas meant that those who lost employment had a strong incentive to return (temporarily) to the countryside in the face of weaker labour demand. As their movements were not recorded in urban labour force data, the return of migrant workers to the countryside had little influence on the survey-based urban unemployment rate.

Indeed, estimates by Du and Lu (2011) suggest that China's non-accelerating inflation rate of unemployment (NAIRU) has averaged around 4.0–4.1 per cent in the period since 2000 (see Graph 3). The NAIRU provides an indication of the level of unemployment that would still prevail, for frictional or structural reasons, in the absence of cyclical macroeconomic fluctuations. Although Du and Lu's estimates are based on survey-based unemployment data rather than registered unemployment figures, the estimated NAIRU nonetheless aligns quite closely with the urban registered unemployment rate of recent years. This is consistent with the idea that fluctuations in the rural migrant labour population in cities and towns do not, in general, exert a significant influence on the NAIRU for urban areas.

Situation 3: Actual and potential growth running at similarly low rates

The third situation (simultaneous weakness in actual and potential output growth) corresponds to the period since 2012, in which growth in the productive capacity of the Chinese economy has moderated, the comparative advantage of China's manufacturing sector has begun to wane, and diminishing returns to capital accumulation appear to have become more evident. In particular, since China entered the period of the 12th Five Year Plan (2011–2015), the working-age population has started to decline and the dependency ratio has begun to rise. At the same

time, slowing rural-urban migration has contributed to tighter conditions in urban labour markets, returns to capital have fallen and TFP growth looks to have eased. Consequently, estimates of the growth of potential output have fallen: Lu and Cai (2014) estimate that potential growth fell by around a percentage point between 2011 and 2013, and their baseline estimates suggest that, other things equal, potential growth will continue to moderate (see Graph 2).

In recent years, the Chinese Government has sought to wind back the economic stimulus of 2008–09 and has encouraged slower growth of domestic demand. This has occurred in tandem with weaker growth of potential output, so the slowing of actual output growth has had a fairly limited negative impact on labour market conditions. The survey-based measure of the unemployment rate was reported by the National Bureau of Statistics to be 5.1 per cent in December 2014, only slightly higher than it was in 2009 and exceeding estimates of the NAIRU by around 1 percentage point, which suggests that cyclical unemployment has not increased by a significant margin.

Situation 4: Actual growth exceeding the rate of potential growth

The fourth situation (weak potential output growth together with strong growth of actual output) could occur in the event that the government seeks to stimulate actual output growth through demand-side levers, in the face of a persistent slowdown in the growth of the economy's productive capacity. If the Chinese Government tried to use countercyclical stimulus policies to prevent a slowing of growth, it would face the prospect of this kind of situation occurring. One indicator that can often be used to gauge cyclical mismatches between actual and potential output is inflation. In the current environment of relatively low consumer price inflation, falling producer prices and moderating growth of aggregate demand, a

pick-up in inflationary pressures might be expected to follow from a large-scale demand-side stimulus. (Of course, if the stimulus expanded capacity in pockets of the manufacturing sector – and put additional downward pressure on relative prices in those industries – the observable impact on inflation could be obscured, at least initially.)

Structural Reform and Rebalancing

In China, policymakers have traditionally addressed slower growth through countercyclical stimulus policies. If the problem is one of a cyclical slowing, such solutions may be effective, as was the case with stimulus policies employed in response to the slowing experienced during the late 1990s. China's policy response to the global financial crisis of 2008–09, which involved a large-scale fiscal-monetary stimulus, also succeeded in ameliorating the effects of a negative external shock, albeit at the cost of sidelining earlier plans to facilitate rebalancing from investment towards household consumption and allowing investment to be driven by technological progress and innovation. In the present climate of slowing rural-urban migration, together with the reversal of China's 'demographic dividend', much of the slowing growth of recent years increasingly appears to be structural in nature. To the extent that this is true, it is unlikely that a similar fiscal-monetary stimulus would be as successful as a response to such a structural slowing of growth.

However, there is reason to believe that a slowing of China's potential growth rate could be moderated, or even reversed for a time, by structural reforms. For example, work by Lu and Cai (2014) suggests that reforms of the *hukou* system, population (fertility) policy, education and training institutions, and unproductive state-owned enterprises could be expected to boost labour force participation, human capital accumulation and TFP growth, thereby raising the growth rate of potential output. Such measures would be unlikely to prevent growth from slowing in the very long run, when growth in the labour supply

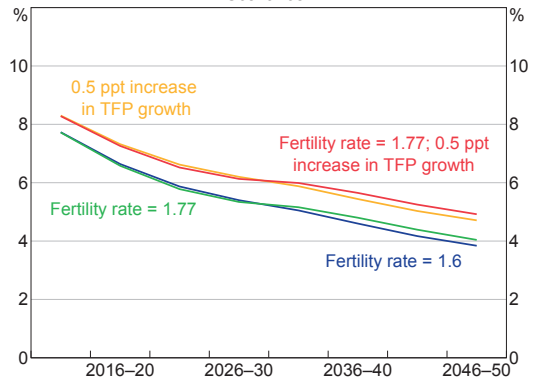
slows and the growth of both capital accumulation and productivity ease as China gets closer to the global productivity frontier. But it remains the case that reforms could prevent an otherwise more rapid decline in output growth.

Among other scenarios, Lu and Cai (2014) consider a hypothetical situation in which TFP growth receives a boost from reform initiatives, and then construct projections for potential GDP growth under alternative assumptions for China's total fertility rate. Stronger TFP growth slows the overall rate of decline in potential output growth – that is, it tends to make the slope of the decline shallower. Intuitively, the disappearance of the 'demographic dividend' and an end to the era of abundant, cheap rural labour means that, ultimately, productivity improvements due to reform endeavours are likely to be key drivers of China's average growth in coming years. A higher fertility rate tends to raise the projected growth of potential output even further. The positive effects of a higher fertility rate take time to become apparent: an increased birth rate will initially increase the dependency ratio and it takes at least 15 years for newborns to reach working-age adulthood and contribute to labour supply (Graph 4).⁶ An implication is that relaxing China's fertility policy (which currently places restrictions on the number of children Chinese adults can have), in combination with other policies, could boost labour supply and hence potential output.

The effect of reforms, such as relaxing the *hukou* system to allow people to relocate more permanently from rural areas to urban areas, or to relocate more conveniently between different urban areas or broader regions, is to boost productivity by increasing allocative efficiency. Allowing factors of production to flow to their most productive location (such as allowing labour to flow from relatively less productive jobs in agriculture to relatively more productive jobs in manufacturing or service

⁶ The purple line in Graph 4 shows the baseline in which the total fertility rate is 1.6 births per woman, consistent with official estimates in the range of 1.5–1.6 (National Health and Family Planning Commission of China 2013).

Graph 4
China – Potential Growth
Scenarios*



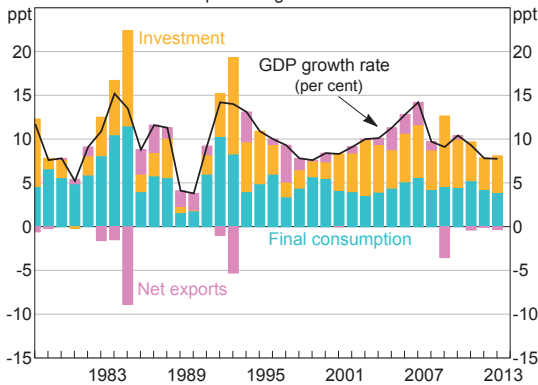
* Annual potential growth of GDP, under alternative fertility and TFP growth scenarios

Source: Lu and Cai (2014)

industries) raises aggregate productivity. Similarly, reducing the monopoly power of state-owned enterprises, streamlining administrative approval procedures, and allowing a greater role for private and mixed-ownership enterprises in the economy could enhance technological progress and innovation, by enabling more productive and innovative firms to succeed and the least efficient and innovative firms to fail. The reallocation of resources arising from reform can thus boost TFP growth and raise the potential growth rate of the economy.

To the extent that the slowing of growth in China over recent years largely reflects structural factors, efforts to facilitate a 'rebalancing' of domestic demand from investment towards consumption are unlikely, by themselves, to moderate or reverse the long-term downward trajectory in GDP growth. Nevertheless, it is worth noting that in the past, especially since the early 2000s, growth of consumption has been relatively stable, while exports and investment have typically been quite volatile (Graph 5). This suggests that increasing household consumption's share of expenditure may be conducive to improving overall economic stability and reducing the call on policy interventions designed to smooth the macroeconomic cycle.

Graph 5
China – GDP Growth
Annual percentage contributions



Source: National Bureau of Statistics of China

It is also worth noting that while reforms aimed at raising household consumption's share of GDP may not directly increase the economy's potential growth rate, initiatives that improve the income distribution and develop the social safety net contribute to broader economic welfare. Increasing the scope for profits by state-owned enterprises to be allocated to households and used for consumption would, for instance, generally be preferable to allowing those funds to be allocated to unproductive investments. Moreover, reforms that support household consumption could be expected to go hand in hand with the other structural reforms discussed above. For example, efforts to improve social security and reduce income inequality could complement *hukou* reforms, by enabling more migrant workers to become settled permanently in cities. Such a combination would not only support greater consumption by newly settled migrant workers, contributing to a rebalancing of demand, but it would also increase labour force participation and boost productivity through a more efficient allocation of resources.

Conclusion

During the Third Plenary Meeting of the 18th Central Committee of the Chinese Communist Party in November 2013, it was signalled that China would embrace a new stage of comprehensive reform and allow the market to play a 'decisive role' in economic development. A simple comparison of growth in actual and estimated potential output over the past three decades, and consideration of the factors supporting potential growth in recent years, suggests that much of China's recent slowing is probably structural rather than cyclical in nature. Accordingly, a substantive reform program along the lines envisaged by the authorities may be necessary for China to sustain relatively high rates of growth over the medium to longer term.

Evidence from the work of Cai and Zhao (2012) suggests that rapid growth of the capital stock and productivity, combined with favourable demographic factors such as a declining dependency ratio and abundant migrant labour, contributed strongly to China's GDP growth over the past few decades. The reversal of these favourable demographics means that China will have to rely increasingly on productivity gains to sustain elevated rates of growth. If this analysis is correct, reforms enhancing productivity and labour participation would have an advantage over efforts targeted at boosting growth through further countercyclical policies to stimulate expenditure. Similarly, reforms to facilitate 'rebalancing' of the economy's demand structure from investment towards household consumption may not be sufficient, on their own, to prevent a decline in potential growth. However, it is likely that such a rebalancing could augment the impact of other, productivity-enhancing structural reforms, and would contribute to a more stable macroeconomic cycle. ❖

References

- Anand R, K Cheng, S Rehman and L Zhang (2014)**, 'Potential Growth in Emerging Asia', IMF Working Paper No 14/2.
- Cai F (2011)**, *Beyond Demographic Dividends*, World Scientific Publishing, Singapore.
- Cai F and W Zhao (2012)**, 'When Demographic Dividend Disappears: Growth Sustainability of China', in M Aoki and J Wu (eds), *The Chinese Economy: A New Transition*, Palgrave Macmillan, Basingstoke, pp 75–90.
- Chang GC (2012)**, 'Move Over, Michigan, China is the World's Next Rust Belt', *Forbes Magazine*, 12 September. Available at <<http://www.forbes.com/sites/gordonchang/2012/12/09/move-over-michigan-china-is-the-worlds-next-rustbelt/>>.
- Du Y and Y Lu (2011)**, '中国的自然失业率水平及其含义 [China's Natural Rate of Unemployment: Level and Implications]', *The Journal of World Economy [世界经济]*, 4, pp 3–21.
- Eichengreen B, D Park and K Shin (2011)**, 'When Fast Growing Economies Slow Down: International Evidence and Implications for China', NBER Working Paper No 16919.
- Felipe J, M Lanzafame and J Zhuang (2014)**, 'The People's Republic of China's Potential Growth Rate: The Long-run Constraints', ADB Economics Working Paper Series No 418.
- IMF (International Monetary Fund) (2014)**, 'People's Republic of China, Article IV Consultation', IMF Country Report No 14/235.
- Krugman P (2013)**, 'Hitting China's Wall', *New York Times*, 18 July. Available at <http://www.nytimes.com/2013/07/19/opinion/krugman-hitting-chinas-wall.html?_r=0>.
- Lewis A (1954)**, 'Economic Development with Unlimited Supplies of Labour', *Manchester School of Economic and Social Studies*, 22, pp 139–191.
- Lin JY (2011)**, 'China and the Global Economy', *China Economic Journal*, 4(1), pp 1–14.
- Lu Y and F Cai (2014)**, 'China's Shift from the Demographic Dividend to the Reform Dividend', in L Song, R Garnaut and F Cai (eds), *Deepening Reform for China's Long-term Growth and Development*, ANU Press, Canberra, pp 27–50.
- National Health and Family Planning Commission of China (2013)**, 'Statement of National Health and Family Planning Commission of China', 19 November. Available at <<http://www.nhfpc.gov.cn/jczds/s3578/201311/f852a9d6833d4c1eb79b9e67f1885416.shtml>>.
- Okun A (1970)**, *The Political Economy of Prosperity*, Brookings Institution, Washington, DC.
- Pritchett L and LH Summers (2014)**, 'Asiaphoria Meets Regression to the Mean', NBER Working Paper No 20573.
- Ranis G and JCH Fei (1961)**, 'A Theory of Economic Development', *American Economic Review*, 51(4), pp 533–565.
- Woodford M (2003)**, *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton University Press, Princeton.

